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Crossing Borders: Resource Flows, the Global Environment, and International Security

Ronnie D. Lipschutz & John P. Holdren*

[I]ndividuals, groups, and nations are profoundly dependent upon the earth and its resources. They are dependent even in their most intensely political relations. . . [E]very effort to manage growth – whether to accelerate, limit, stabilize, or redistribute – has potential security ramifications.¹

1. Introduction

A centerpiece among popular conceptions about the determinants of US foreign and military policy since World War II, fed by some forty years of pronouncements by its political and military leaders, is the notion that a great industrial nation must be prepared to use *military force* to defend its access to foreign sources of raw materials. US troops went to Korea in 1950. Americans were told, not merely to contain the Communist tide for fundamental geopolitical and ideological reasons, but also to prevent the loss to the West of Korean tungsten, Malaysian tin and rubber, New Caledonian nickel, and Indonesian oil.

Similar explanations were periodically offered to the public in the 1960s for the growing US military involvement in Vietnam. And the key US interest driving the willingness to use military force in the Middle East, every US Administration from Truman's to Reagan's has assured its citizens, has been to maintain Western access to the two-thirds of the world's petroleum reserves that underlie that troubled region.

And yet: has the problem of access to resources really played such a central role in shaping US foreign and military policy in recent decades? We would say no, nor is it likely to play such a role in the future. In fact, a greater threat to international security lies in the ongoing *degradation of the planetary environment*, and the effects that this may have on the well-being and stability of many Third World countries. In this paper, therefore, we address three related topics: (1) Has access to material resources been an important cause of international conflict? (2) Are material resources likely to be a factor in generating international conflict in the future? and (3) Are problems of environmental degradation – most critically, those associated with overexploitation of certain resources – likely to be contributory elements to international conflict in the future?

2. Have Mineral Resources Mattered? *Raw Materials and the Foreign Policies of States*

It is commonplace to describe the drive for access to scarce resources as a major underlying motive of the foreign policies of states, particularly industrialized ones. In a compa-

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rative study of the raw materials policies of Japan and the United States, for example, Raymond Vernon asserts that:

In the modern history of international relations, the struggles of industrial states over the control of basic raw materials have provided a recurrent theme. The urge of industrialized nations to capture secure sources of raw materials was a major factor in the competition of European powers as they carved up Africa during the last decades of the nineteenth century; it figured in the motives of Germany and Japan in the great wars of the twentieth century; it pitted Britain, France, and the US against one another during the 1920s in arcane political maneuvers over the Middle East and it occupied center stage in the 1970s as the members of the Organization of Petroleum Exporting Countries attempted to control the world market for oil.²

It is not difficult to see where leaders (and publics) could get the idea that it lies in the nature of a great power to acquire and protect access to foreign resources, and that even going to war over such access is within the realm of reasonable state behavior. For this idea has permeated the literature of foreign relations and international conflict, all the way back to Thucydides. Certain elementary facts about mineral resources, moreover, seem at least broadly consistent with the proposition. First, many such resources are unquestionably essential both to the economic prosperity and to the military strength of any nation. Second, the extent to which different nations are endowed with their own deposits of these resources is wildly uneven. And, third, constrictions in the international flow of certain resources whose extraction is concentrated in only a few countries have, from time to time, indeed generated significant economic disruption.

Yet, there is scarcely a study to be found that supports with analysis or examples the notion that trying to defend resource access militarily, or simply preparing to try to do so, actually pays off. Almost always the costs of military action – or military preparations – are extremely high,³ the chances of

succeeding in a military venture to protect access to a threatened resource are extremely low,⁴ and the alternatives to protecting access are much more promising. (There is also a striking circularity to the idea that a country must build a large military force in order to defend access to the resources needed to build a large military force.)

With respect to the United States, the belief that foreign policy has been directed by a struggle for raw materials seems particularly acute. As Michael Shafer perceptively wrote, 'each generation of US foreign policy makers since Theodore Roosevelt has discovered – and forgotten – a strategic minerals crisis of its own'.⁵ Indeed, since the end of World War II, US policymakers appear to have been almost continuously preoccupied by the resource question – notwithstanding the advantages of free trade, and the seeming plenitude and the decreasing costs of oil and minerals over much of the period.

Indeed, it has been frequently asserted or implied by official and unofficial analysts alike that a systematic program to deprive the West of assured access to Third World resources has been a major pillar of Soviet foreign policy for decades, accounting for the pattern of Soviet involvement in the Middle East and Southwest Asia, in Africa, and even in Central America.⁶ This 'resource war' theory concerning Soviet strategy has been on the wane in the academic community for some time; but it continued to exert a powerful hold on the popular imagination and the thinking of at least some political and military leaders far beyond the time when it made any sense whatsoever.

The aim of protecting access to resources has been used not only as an explanation of particular US military actions or preparations for such action, but also – not surprisingly – as a rationale for the kinds of military forces the USA needs to procure and maintain. Until relatively recently, for example, the case for a 600-ship navy was argued largely in terms of the requirements

for protecting far-flung US resource interests – including, of course, the maintenance in wartime of secure ‘sea lines of communication’ by which these resources would travel to the US defense-production complex to be transformed into war materiel. And the ‘Rapid Deployment Force’ – later renamed the less-provocative ‘Central Command’ – was a Carter Administration innovation intended to underline the US commitment to use force to protect Middle Eastern oil resources.⁷

What is curious about the conventional wisdom regarding resources and war is that, although there have been periodic difficulties with supplies due to increased demand or depletion of domestic sources of raw materials, the general worldwide picture has not been particularly gloomy. The problem has virtually always been one involving the *distribution* of resources – and real or perceived injustices about who possessed what. As a result, the heart of the matter has been the *intertwining* – in official thinking and decisionmaking about the role of resources in international affairs – of ideology with analysis, of ideal interests with material ones, of ends with means, of historical influences with contemporary realities, and of motivation with rationalization. First of all, that is, while resources unquestionably have played a role in the foreign and military policies of modern industrial states, this role has usually been a secondary one, enmeshed in more fundamental causes and effects. Rather than being the primary aims of policies or the fundamental sources of conflicts, resources have more often (a) become important for sustaining war efforts undertaken for other reasons, (b) been used to exercise leverage in support of policies having nothing to do with the resource themselves, or (c) served as (at best oversimplified) rationalizations, for consumption by publics and legislatures, in support of policies with much more elaborate origins.

Many people would be inclined to regard the case of Middle Eastern oil as a compelling counter-example to the argument

presented here. In fact, and to the contrary, the oil example supports rather than undermines the thesis that resource considerations usually are – and almost always should be – secondary rather than primary factors in shaping foreign and military policies. While Middle Eastern oil comes closer than any other mineral resource to being indispensable and irreplaceable enough to justify preparing to fight to protect access, the case is not persuasive. If one examines the matter closely, oil does not in fact seem to have been or to be the primary reason for US military involvement in that region.⁸ This is particularly true with respect to the recent US naval effort in the Persian Gulf – although the argument is generally applicable throughout the post-World War II period.⁹

It is revealing, first of all, that in the mid-1980s US oil imports from the Middle East accounted for only 14% of total oil imports, 4% of total oil consumption, and 1.7% of total energy use for the USA – scarcely enough on its own to warrant going to war to protect it. (At the peak of US oil-import dependence, in 1977, the flow from the Middle East accounted for 17% of US oil consumption and about 8% of total energy use – higher fractions than today’s, but nonetheless much easier to replace or conserve than to defend by force.) And even though US imports of oil are rising once again after some years of decline (they apparently began to exceed 50% once again in January 1990), flows from the Middle East still comprise only a relatively small fraction of this total.¹⁰ Western Europe and Japan are more dependent on Middle East oil – amounting in the mid-1980s to almost 40% of Japan’s total energy and 12% of Western Europe’s – which seems to some the central reason for regarding the Middle East as a core strategic interest of the United States. But the Western Europeans and Japanese themselves – who are after all the ones most directly at economic risk from this dependence – have been far less enthusiastic about maintaining a major Western military presence in the Middle East than

has the United States. Instead they have preferred to build fuel-frugal cars (Japan) and nuclear reactors (France), while assuming that a complete cutoff of Middle East oil is extremely unlikely under almost any circumstances. After all, such an eventuality would not be in the interest of the countries in the region, nor even the Soviet Union, which needs food and technology from a prosperous West at least as much as the West needs Middle East oil.

All of this is not to imply that oil considerations have played no role in the attitudes and policies of the major industrial powers toward the Middle East: they *have* played a role, but for the most part not the biggest one. The United States, in particular, does what it does in the Middle East because of a constellation of convictions and interests, including not only conceptions about the importance, vulnerability, and defendability of the oil, but also the venerable philosophy of 'containment' of the Soviet Union in general geopolitical terms; a culturally and historically grounded commitment to the viability of the state of Israel; and – intertwined with the rest – a sense of how a great power should define and protect its interests if it wishes to remain a great power. Oversimplifying just a bit, one could say that the United States is in the Middle East more to protect its status as a superpower than to protect access to oil for oil's sake.

Can a similar case be made for the foreign policies of other powerful, industrialized states? Although it is risky to generalize, it seems safe to say that the desire to make the world an economically and politically safer place is one that is widely held. Only a few nations ever possess the wealth and power necessary to the pursuit of this goal, and those states use whatever tools are at hand in that effort. Control of flows of resources is one of these tools. But to go the next step and claim that resource flows are a *direct* cause of international conflict is to ignore most of the other forces and motives that impel decision-makers to action.¹¹

3. Will Mineral Resources Matter? The Changing Political Economy of Strategic Resources

What are the prospects for the foreseeable future? On review, there do not seem to be any other mineral resources with the potential to exert in the future even remotely as much influence over international affairs as oil has done in the last 20 years. To be sure, there are a number of 'strategic' metals and ores – perhaps most importantly, from the US standpoint, chromium, cobalt, manganese, and the platinum group metals – that are currently essential in both the defense and non-defense sectors of modern industrial economies, and that are found in attractive concentrations and quantities mainly in the Soviet Union and a few countries in Africa. And a longer list of essential minerals for the supply of which the United States relies heavily on imports, mostly from the Third World, is easily compiled: in addition to the 'big four' already mentioned, more than two-thirds of US consumption of columbium, strontium, bauxite, tin, titanium, nickel, zinc, and tungsten (among others) come from imports. But none of these resources, and no combination of them that is controlled by a small or politically cohesive group of nations, even approaches the economic value or potential for short-term economic disruption that attaches to oil. And, as we have noted earlier, the case for concern about oil is questionable.

Much confusion has arisen about these matters through a persistent failure of publics and policymakers alike to distinguish between *dependency* on mineral imports and *vulnerability* to shortages of those minerals. Dependency on minerals is widespread and immediately quantifiable. To be vulnerable, however, requires, in addition to dependency, a politically realistic possibility of being cut off, a lack of alternatives, and the expectation of significant impacts from doing without. For years, the annual Posture Statement of the US Joint Chiefs of Staff contributed to the confusion by presenting, early in its treatment of the

challenges to which the US military must be responsive, a table of mineral dependency – *without* any accompanying discussion of the additional factors germane to vulnerability.¹² Yet only very rarely are all those factors aligned so as to produce an acute vulnerability.¹³ Where the vulnerability is genuine, one can add, there is rather little reason to think that use or threats of force will help much.

Some specific trends, moreover, support the proposition that raw material resources are becoming less important in international politics, rather than more so, as time goes on. Among these are a shift within the major consumers of raw materials: *rates* of growth in the consumption of critical materials in industrialized countries are slowing as a result of the saturation of goods and the development of new 'space age' materials.¹⁴ The slowdown is particularly the case with respect to the United States, which has experienced a rather rapid diminution in its once-predominant role in global consumption of mineral and energy resources (but this appears to be the case, as well, for the Soviet Union).¹⁵

In the early 1950s (the time of the Paley Commission report, *Resources for Freedom*) it was a commonplace observation that the United States accounted for about 50% of the world's annual consumption of mineral resources. But by 1965, when this figure was still being widely quoted, a more representative number would have been 25 or 30%, and by 1985 it had fallen still further.¹⁶ This transition has resulted partly from rapid and sustained economic growth in other parts of the world, and partly from a shift away from heavy, materials-intensive industries in the United States. The consequence has been that reliable raw materials supply is no longer so much a special interest of the United States as it is a universal interest of a far-flung industrial civilization.

A second trend, albeit a generally slower one, has been geographic diversification in the sources of supply of critical minerals, in terms of both the pattern of extraction worldwide and the distribution of purchases

by the United States. The most pronounced example of this has been petroleum, in which the Middle East share of world production plummeted from nearly 40% in the mid-1970s to about 20% in the mid-1980s, with increases in Mexico, the North Sea, and China, among others, making up the difference.¹⁷ More gradual reductions in the dominance of the biggest producing regions have been evident over the same period for cobalt, nickel, bauxite, and a number of other strategic minerals. These tendencies are limited, to be sure, by the realities of the distribution of the richest deposits; but the oil experience should have taught us that when the economic or political costs of the usual sources of supply rise too sharply, other sources previously considered uneconomic may come into play.

The alternatives include not only lower grade deposits of material that are more widely distributed than the high-grade ones, but also recycling (non-energy resources), conservation (optimizing applications to obtain increased functional benefits from each kilogram of material), and substitution of more abundant materials capable of performing the same functions. Recycling has been gradually increasing for many critical resources, despite a number of technical and institutional obstacles. Increases in efficiency of use of critical minerals have also been steady, if gradual, and would accelerate sharply if constrictions of international flows (or even serious threats of constrictions) added to the motivations. Finally, remarkable advances in materials science have been expanding the possibilities for substitution – ranging from changing the composition of particular alloys (replacing scarce ingredients with more abundant ones conferring the same properties) to replacing metals altogether in some applications with ceramics and composites made from universally available materials.

In a longer-term perspective, it is certainly possible that depletion of the richest resources of some key minerals – and rising environmental burdens of extracting and

harvesting others – will outrun the offsetting effects of technological improvements, increasing the role of raw materials in the real cost of living in an industrialized world. Whether resource depletion will become a direct cause of international violence, as some have suggested in the past, remains unpredictable.¹⁸ But as to the role of mineral-resource supply questions per se in governing the formation of political and military policies, this seems likely to shrink further in the near future than to blossom into a primary cause. International flows of energy, non-fuel minerals, manufactured goods, technology, money, and information have grown so large, so multifaceted, so ubiquitous, and so mutually indispensable that the idea of any country or group of countries waging systematic economic warfare against others by restricting a subset of those flows is becoming less plausible all the time.

This insight seems to have reached even those unnamed laborers in the trenches of strategy articulation who write the annual statements on US military posture in the Organization of the Joint Chiefs of Staff. In the last few editions, the prominence given to critical minerals has shrunk noticeably, being confined largely to passing mention in lists of US interests in various parts of the Third World plus a brief discussion of the implications of the material needs of the US military establishment (emphasizing stockpiling and maintenance of sea lines of communication in wartime). In place of the previous, rather heavy-handed emphasis on access to resources in the opening sections of the posture statement, there are now more sophisticated summaries of US interests, stressing the desirability of supporting a political climate favorable to economic cooperation and interdependence in general.

But we should not be too hasty in thinking that old myths can be laid to rest. Even as US–Soviet relations have improved far more than anyone could have imagined even two or three years ago, strategic analysts in Washington DC, Cambridge

MA, and elsewhere are busy combing the planet for new threats to be countered by the US military. We can be sure that, in the future, arguments about ‘Third World strategic minerals’ will be one of the rationales given for procuring long-range expeditionary and force projection capabilities by the US Armed Forces.

4. What Resources Will Matter? The Global Environment and International Politics

While access to mineral resources probably has played a less important role in affecting the potential for international conflict than is usually supposed – and indeed seems to be declining further in importance as time goes on – a different dimension of the material appetites of civilization has been rapidly growing in its salience for international affairs: the *environmental* one. This includes the direct hazards to human health from the routinely or accidentally released effluents of resource-supply technologies (e.g. radioactivity from nuclear-energy facilities, toxic chemical compounds from fossil-fuel combustion and petrochemical manufacturing, toxic trace metals from mineral mining and processing, and biocide residues from agriculture). More importantly, it includes impacts on the environmental conditions and processes that control the supply of indispensable ‘renewable’ resources such as food, water, biomass fuels, and forest products. In the case of energy, in particular, it is becoming increasingly likely that the most intractable problems – and the greatest threats to international stability – could come not from the economics or politics of supply but from large-scale environmental and social ‘side effects’ of energy sources – such as climate change by carbon dioxide from fossil fuels, or the spread of nuclear bomb materials by nuclear energy technology.

For most of the quarter century during which large-scale environmental problems have been a significant focus of public and policymaker concern, the direct toxic hazards to human health have received the

lion's share of attention, while the subtler, more complex disruptions to biogeophysical processes have, by comparison, been neglected.¹⁹ This focus on the toxic substances dimension has acted to minimize concern with the implications of environmental problems for international relations, for two reasons.

First, the human-toxicity impacts of effluents are generally most pronounced in the vicinity of the emissions source. In other words, the most severe impacts of this sort tend to occur within the country responsible for the emissions. This is not to say that toxic hazards (or fears about them) never cross international boundaries: the Chernobyl accident and numerous toxic spills in international rivers provide obvious examples to the contrary. But precisely because the largest and most obvious toxic impacts usually occur on the territory of the perpetrator, the extent of international outrage and corresponding tensions associated with such events is likely to be quite modest in comparison with circumstances in which one country or a group of countries is seen to be exporting large damages while suffering relatively little at home.

Second, the total damages associated with environmental problems of the toxic hazards variety are rarely, if ever, large enough to constitute the sort of national setback that might provoke a significant change in a country's international behavior – as, in contrast, severe national economic difficulties have been known to do. To take the Chernobyl example, the impressive in-country economic costs, now estimated to approach USD20 billion, nonetheless represent only about 1% of the Soviet Union's gross national product for one year. The excess cancer deaths that may occur over the next 50 years as a result of the accident – perhaps 15,000 in the Soviet Union – represent less than a tenth of a percent of the cancer deaths that will occur in the exposed population from other causes during the same period.²⁰ It should not be surprising, therefore, that while the toxic hazards of pollution remained important on

national political agendas at the end of the 1980s, it has only been the emergence of a much more fundamentally and pervasively threatening set of environmental problems – in the form of alterations to biogeophysical conditions and processes at regional to global scale – that has shoved environmental issues onto center stage internationally and made it plausible that not only health but also international security could be at stake.

The four most prominent environmental problems in this category are: (1) climate change due to anthropogenic additions to the atmosphere's stock of infrared-absorbing trace gases (most importantly carbon dioxide, methane, nitrous oxide, and halogenated hydrocarbons); (2) contamination of the stratosphere with substances that destroy ozone, resulting in increased penetration of biologically disruptive ultraviolet radiation to Earth's surface; (3) acid precipitation caused by emissions to the atmosphere of sulfur oxides and nitrogen oxides, resulting in clear damage to poorly buffered freshwater ecosystems and possible widespread impacts on forests and nutrient cycles; and (4) destruction of tropical forests by overharvesting and land-clearing.

These problems are interconnected in some obvious ways (e.g. net deforestation contributes to carbon dioxide buildup, and nitrous oxides and chlorofluorocarbons are implicated in both the 'greenhouse' problem and ozone depletion) and probably in other ways not yet obvious (e.g. acid precipitation could be affecting bacterial processes that influence atmospheric concentrations of methane and nitrous oxides). In any case, together and separately, the problems in this class have the potential to undermine human well-being on a scale far larger than that of the direct toxic damages of pollution. Mechanisms of such change include: drastic changes in the hydrologic cycle and thus in availability of fresh water; alterations in growing seasons and crop yields; altered distributions and intensities of diseases and pests affecting humans, domestic animals, crops and forests; changes in sea level; reductions in fish catches; reduced availabil-

ity of fuel and fiber from forests; and reduced genetic diversity in nature – on which one would wish to draw in seeking to ameliorate some of the other phenomena.

The nature and magnitude of these problems cannot yet be predicted in detail, nor can it be said with any assurance how they will be distributed among countries and regions. What can be said, however, is that the impacts could easily be large enough to entail massive suffering in the countries most severely affected, that the associated stresses could contribute importantly to regional and global tensions, and that the imaginable if unpredictable actions of governments under such circumstances could even lead to armed conflict. The potential contribution of environmental problems of these types to international tensions is associated not only with the magnitude of the suffering they may cause, but also with a separation between cause and effect, and between perpetrator and victim, which differs sharply from the situation typical for pollution problems. For example, in the case of disruptions of large-scale biogeophysical processes, there is often little correlation between the loci of the main causative factors and the loci of greatest vulnerability. Damages from acid precipitation may be at their worst some 1,000 kilometers downwind from the main emitters of acid precursors. The ecosystems and human populations at greatest risk from increased ultraviolet radiation may not be those from which the main emissions of ozone-eroding chemicals come. And there is no obvious relation between the pattern of carbon dioxide emissions and the places likely to suffer most from CO₂-induced climatic change. Thus the countries and regions that end up bearing the severest impacts of biogeophysical change may feel, with some reason, that these damages were inflicted upon them by the irresponsible actions of other nations. The resulting resentments can hardly fail to aggravate international tensions.²¹

The separation of causes and consequences characteristic of environmental

problems of the biogeophysical type is likely to be particularly pronounced in the case of the greenhouse gas/climate change problem, which with the help of recent droughts also happens to be the most prominent of all the problems in the public mind and on the political agenda. More than two-thirds of the greenhouse effect comes from carbon dioxide and chlorofluorocarbons – gases that come in overwhelming proportion (more than three-quarters) from activities in the industrialized nations.²² Yet the vulnerability to massive societal disruption by greenhouse-related climate change is far greater in the less developed countries than in the industrialized ones. The LDC's have much higher fractions of their populations malnourished to start with; they have smaller food reserves, and less capacity to buy food from other parts of the world (which would be a possibility if climate-induced crop failures were only regional rather than global). They have smaller capacity to alter agricultural practices quickly (because of lack of capital and infrastructure), greater vulnerability to flood and drought (because of settlement patterns and lack of reservoir storage), and greater vulnerability to an altered disease environment.²³

More generally, one can say that the direct dependence of human society on the renewable resources rooted in the biosphere is even greater in the LDCs than in industrial nations, which engage in much more extensive exploitation of *non-renewable* resources than LDCs. Since it is mainly renewable resources – and the environmental functions associated with them – that are at risk from the biogeophysical changes we are discussing, one must expect the vulnerability of the LDCs to be especially great.²⁴

The likely concentration in the LDCs of the severest impacts of the 'new' biogeophysical threats – and of the resulting resentments and tensions – accentuates an already obvious southward tilt in the potential sources of large-scale conflict. Nearly all of the major conflicts since World War II

have taken place in the South,²⁵ and the reasons are not difficult to find. The major ideological adversaries in the North have, on the whole, acted with extreme caution along the boundary of the two blocs, where the most central interests of the two sides are at stake and where huge concentrations of conventional and nuclear forces underline the potentially catastrophic consequences of a misstep. By contrast, the southern peripheries of superpower spheres of influence – characterized by less stable alignments and less sharply defined interests – have inevitably provided a more tempting arena in which to seek advantage. The reasons for the superpowers themselves to confine their troublemaking to the South exist against a background of superabundant indigenous sources of tension – a rich array of religious and racial hatreds, ideological incompatibilities, and territorial disputes, compounded by the frustrations of poverty, the frictions of modernization and development, and, in many cases, the birth traumas of new statehood.

There is a long tradition in the North – among analysts, publics, and policymakers alike – of underrating both the magnitude of the problems faced by the South and the size of the threat that these problems pose for the rest of us. One part of this syndrome is the conceit that the superpower confrontation is the pre-eminent international security problem on the planet; and, correspondingly, that cooling this confrontation will make all other security problems manageable. A related perception is that most conflicts which do arise in the South will pose little threat to the North as long as the major powers refrain from trying to exploit the situation.

The fact is, however, that although many conflicts in the South have been instigated or aggravated by the interventions of industrial nations, the ability of the major powers in the North to control or even to predict what happens in the South has been declining steadily.²⁶ Indigenous military capabilities have been growing impressively (supplied partly by massive arms transfers

from the North and partly by the rapidly growing arms industries of the South itself), including a quite alarming spread of nuclear and chemical weapons capabilities and ballistic missiles. The independence and assertiveness of many countries in the South have been growing apace. The web of political, economic, and military ties linking North and South is now far too weak to be used by the North to control the South, but still too strong to permit the powers of the North to disentangle themselves – even if they were so inclined.

In the face of these circumstances, then, the notion that we in the North can either manage the South or isolate ourselves from instabilities and upheavals originating there begins to seem positively quaint. Add to the picture the potential for drastically increased levels of deprivation in the South caused by global biogeophysical change, as well as the likelihood that the pre-eminent role of the North in generating these problems will, even more than usual, incline the South to blame the North for its predicament – and the threat to peace should be fully apparent.

5. What is to be Done?

It is increasingly apparent that the world's problems cannot be solved by wishing them away or pretending they do not exist. It is also becoming increasingly evident that the world's problems are those of the North as well as the South. As the largest consumers of raw materials, producers of greenhouse gases, and exploiters of Third World instability, the two superpowers must come to acknowledge their responsibility to address and ameliorate the consequences of their policies in the South and elsewhere. Moreover, the economic interests and connections between the industrialized and developing worlds are obvious and likely to grow in importance in the future, even for the Soviet Union. If superpower relations continue to improve, we may be able to say that peripheral conflicts are a thing of the past. To the extent that cooperative efforts can now eliminate potential sources of

future conflict and instability, and can assist Third World states towards sustainable development, they are worth initiating. If cooperation can, in addition, take place in formerly contested regions of the world, uncertainty about each other's intentions and motives could be reduced.

Where to begin? Consider a few statistics. According to the World Health Organization, 20% of the world's population suffers from serious health problems. These could be dramatically reduced by the expenditure of only USD2 billion per year. For 1989, poor countries will have spent more than USD15 billion on food imports; current total global expenditures on agricultural research are less than USD10 billion per year. The United States spends more than USD300 billion per year for military purposes and less than USD15 billion for foreign aid – and much of this is 'security assistance', not development aid. It could cost upwards of USD1,000 billion to rehabilitate urban infrastructure and provide decent housing for everyone in the USA alone: probably less than USD50 billion was allocated for this purpose in 1989. In 1988, developing countries – many of which are of great economic importance to the United States – exported *USD50 billion* more than they received in paying off the interest and principal on their debt. And all the while, global expenditures on weapons and soldiers approached *USD1 trillion* and consumed upwards of 40% of the world's scientific and technical capabilities.²⁷

This is an impressive list and it is by no means complete. Indeed, the average US citizen is likely to look at such an inventory, and the potential costs of solutions, and throw up his or her hands in helplessness. But is the situation really so hopeless? Fortunately, there is good reason to think not. The thawing of relations between the United States and the Soviet Union provides a golden opportunity to begin solving these problems in a way that serves our own self-interest as well as that of the rest of the world.

The crucial point is that many of these

problems are related and can be solved together. Take global warming. If we are to combat it effectively, shifting away from fossil fuel based energy sources will be necessary. We will have to devise new road- and rail-based mass transit systems, rebuild basic existing electric generating plants, redesign housing patterns and rebuild infrastructures in our great metropolises, engage in intensive conservation of energy, and develop and deploy renewable energy systems. All of these things, taken together, have the potential to employ more individuals, generate more in the way of 'national product', and offer more potential for developing innovative, cutting-edge technologies than any of the business-as-usual trade or defense strategies currently so popular in decisionmaking circles. As a result of a comprehensive approach to the global warming problem, housing will become more affordable, cities will become better places in which to live, and the revitalization of industries and infrastructure will help combat the linked problems of poverty, drugs, and ill health.

And the list of possibilities does not stop there. If, for example, the USA were to support a program of industrial and civil reconstruction in the Soviet Union and Eastern Europe, not only would this serve to bolster reform there but it would also 'prime the global economic pump' in much the same way as the Marshall Plan did in the late 1940s. Implementing strategies of sustainable development in the Third World (as well as in the First and Second Worlds) would help not only to restore the ravaged environments and economies of developing countries but also to provide significant employment opportunities in both the North and South. Improved living standards in the South would help to reduce global population growth and to increase international trade and well-being.

Where is the money to come from for such programs? The United States could not, by itself, pay for domestic and global renewal; and, realistically, no country in the North – and certainly not the United States

– is likely to spend any ‘peace’ dividend on rescuing the Soviet Union or the Third World. Only if there is some domestic gain to be realized from such efforts is there likely to be progress toward resolving the long list of domestic and global problems. But there is no reason to think that the bulk of savings from reduced military expenditures must be spent abroad. Indeed, if the USA makes an effective and substantial effort to set its own house in order, this may set an example to be followed by many other countries, including those in the Third World that now spend significant fractions of their own resources on armaments.

A relatively modest first step could be to try to reduce the US military budget by one-third (or about USD100 billion). Here, USD45–60 billion could come by cutting land and naval forces; another USD30 billion might be obtained as the result of a START treaty (including elimination of SDI, the B-2 bomber, and the Trident D-5 missile, none of which is necessary). And USD10 billion more could be realized by reallocating ‘security assistance’ and economic support funds for US military allies to development assistance. Of this, 70% might be spent on domestic programs and 30% abroad. Note also that this would not be a complete loss: it has been estimated that every dollar sent abroad from the United States brings back three to four in trade opportunities. While not sufficient to fund global renewal, all this would represent a significant first step.

The Worldwatch Institute estimates that a global program of sustainable development aimed at reducing environmental degradation in the Third World and establishing viable economic conditions there would cost about USD140 billion per year for 10 years. Reconstruction aid to the East might total another USD100 billion per year. If we add in the costs of replacing carbon-based energy sources with other technologies, of reducing energy use through greater efficiency, and of rebuilding domestic infrastructure in the United States (another USD100 billion or so), we arrive at a total of

some USD350 billion per year. While this might seem a lot, it is still only about *one-third* of annual global military spending, and perhaps 3% of global GNP.²⁸ Of potentially greater significance would be the technological and scientific capabilities that could be reoriented away from weapons research. If only one- third of the 40% of the world’s scientists and engineers that devote their energy to the many arms races were instead dedicated to a program of global reconstruction, then significant progress should not be long in coming.

6. Some Concluding Thoughts

Years ago, during the chilliest days of the Cold War, a few prescient analysts recognized that the most intractable threat to peace on the planet would turn out in the long run not to be the ideological confrontation between East and West *per se*, but rather the stresses arising from failure to secure the material ingredients of a decent existence for substantial segments of the world’s population. The US geochemist Harrison Brown (*The Challenge of Man’s Future* (1954)) and the Soviet physicist Andrei Sakharov (*Progress, Coexistence, and Intellectual Freedom* (1968)) saw the plight of the impoverished South as the most difficult and dangerous element of the problem. Both proposed a massive cooperative assault on the problem by East and West – seeing in this approach the only plausible means of mustering resources adequate to the task, and visualizing at the same time an important contribution to East–West tension reduction through cooperation in the great effort required.

In view of the size of the effort necessary to provide real likelihood of avoiding such an explosion – both by bringing under control the driving forces behind global biogeophysical change and by building up the environmental, technological, and sociopolitical basis for sustainable prosperity in North and South alike – there can be little doubt that Brown and Sakharov were right all along. The problem requires no less than a major redirection of the scientific,

technological, and organizational resources of the planet, in which full East-West cooperation will be essential. In this context, continued bickering about what is left of the US-Soviet ideological dispute is a silly distraction; the continued diversion of USD1 trillion per year of the world's economic product into armaments is an intolerable handicap.

NOTES AND REFERENCES

1. Richard K. Ashley, *The Political Economy of War and Peace* (London: Frances Pinter, 1980), pp. 3, 5.
2. Raymond Vernon, *Two Hungry Giants – The United States and Japan in the Quest for Oil and Ores* (Cambridge, MA: Harvard University Press, 1983), p. 1.
3. The Rocky Mountain Institute, for example, has estimated the effective cost of protecting each barrel of Persian Gulf oil transported through the Straits of Hormuz in 1988 to be more than USD200. See Amory B. Lovins & L. Hunter Lovins, 'Drill Rigs and Battleships are the Answer! (But What was the Question?)' (Snowmass, CO: Rocky Mountain Institute, Draft, 16 April 1988), p. 2.
4. Which is why, no doubt, Anglo-American plans in the 1950s called for the destruction of the Middle East oil fields in the event of war with the Soviet Union; see R.D. Lipschutz, *When Nations Clash* (New York: Ballinger/Harper & Row, 1989), ch. 4.
5. Michael Shafer, 'Mineral Myths', *Foreign Policy*, no. 47, Summer 1982, p. 155.
6. This hypothesis has stressed denial of Western access more than acquisition of Soviet access, because the Soviet Union possesses within its own territory the richest and most diverse mineral endowment of any country in the world.
7. In subsequent planning, however, the role of the RDF was expanded to include other regions and real or imagined threats to sources of critical materials, wherever they might be found and whether or not the security of the United States or its allies was actually at risk.
8. See Lipschutz, *When Nations Clash*, chs 5, 6.
9. Theodore Draper, 'American Hubris: From Truman to the Persian Gulf', *New York Review of Books*, 16 July 1987, pp. 40–48.
10. British Petroleum (BP), *Statistical Review of World Energy – 1987* (London, June 1987), pp. 18, 34; W. L. Liscom, ed., *The Energy Decade, 1970–1980* (Cambridge, MA: Ballinger, 1982), pp. 270–271.
11. See Lipschutz, *When Nations Clash*, chs 5–7.
12. Ironically, one of the most serious shortages of a strategic mineral ever suffered by the United States took place during the Vietnam War, when nickel imports from Canada were halted by a miners' strike in that country.
13. Even in the case of oil the vulnerability proved much less over the medium term than had been widely supposed. Diversification of supply, substitution, and conservation turned out to be remarkably effective in reducing consumption.
14. Although newly-industrialized and developing countries might be expected to take up the slack, this has so far failed to happen, due to generally low standards of living in those countries. Whether this will change in the future is unclear.
15. Robert H. Williams, Eric D. Larson & Marc Ross, 'Materials, Affluence, and Industrial Energy Use', *Annual Review of Energy* 12, 1987, pp. 99–144; J. P. Cole, 'Is the USSR Entering the Post-Materials Age? Trends in Per Capita Production of Primary Materials', *Soviet Geography* vol. 29, no. 5, May 1988, pp. 476–500.
16. Some actual US shares in 1950 were: crude oil, 63%; nickel, 62%; bauxite, 47%; iron ore, 42%; copper, 38%; coal, 25%. By 1985 the figures were 27% for oil, 14% for nickel, 12% for bauxite, 8% for iron ore, 15% for copper and 18% for coal; see BP, *Statistical Review*; and US Bureau of Mines, *Minerals Yearbook – 1987* (Washington, DC: US Government Printing Office). Figures for 1950 were so large as a consequence of World War II and the destruction of European industry in the war.
17. BP, *Statistical Review*, pp. 4–5.
18. See, for example, Bruce Russett, 'Security and the Resources Scramble: Will 1984 be like 1914?' *International Affairs*, vol. 58, no. 1, winter 1981/82, pp. 42–58; Arthur H. Westing, 'Introduction', in A. H. Westing, ed., *Global Resources and International Conflict – Environmental Factors in Strategic Policy and Action* (Oxford: Oxford University Press, 1986).
19. Geographers, biologists, and conservationists have had a much longer-standing concern with a land-centered set of environmental problems including erosion, deforestation, desertification, salination, and waterlogging (see, e.g. G. P. Marsh, *Man and Nature*

- (New York: Scribner, 1864, reprinted Harvard University Press, 1965); W. L. Thomas, ed., *Man's Role in Changing the Face of the Earth*, 2 vols. (Chicago: University of Chicago Press, 1956)), but these issues have generally not had the salience with industrial-nation publics and politicians that pollution issues have enjoyed since the late 1960s. In developing countries, by contrast, land-centered problems have generally been taken more seriously than pollution problems have.
20. L. R. Anspaugh, R. J. Catlin & M. Goldman, 'The Global Impact of the Chernobyl Reactor Accident', *Science*, vol. 242, 1988, 1513–1519; C. Hohenemser & O. Renn, 'Shifting Perceptions of Nuclear Risk: Chernobyl's Other Legacy', *Environment*, vol. 30, no. 3, 1988, pp. 5–11, 40–45.
 21. The resentments presumably would be even greater if there were clear 'winners' as well as 'losers' in the wake of major biogeophysical change. The possibility of 'winners' has been much discussed in the particular case of climate change, but in our view this outcome is less likely than is commonly supposed. The reason is that any rapid climate change is likely to be disruptive of biological productivity in the short run, even if the new climate that settles in after the transition period may be 'better' than the old one.
 22. The responsibility for greenhouse warming in the 1990s is expected to be, approximately, carbon dioxide 55%, methane 20%, chlorofluorocarbons 15%, nitrous oxide 5%, tropospheric ozone and other 5% (World Resources Institute, International Institute for Environment and Development and United Nations Environment Programme, *World Resources 1988–89* (New York: Basic, 1988)). The geographic pattern of emissions of methane and nitrous oxide cannot yet be specified because the sources of these gases have not been sorted out in detail.
 23. It may be argued, on the contrary, that the LDCs will be less affected than the industrialized nations because greenhouse warming is expected to be greater in the high latitudes, where most of the rich reside, than in the tropics, where most of the poor are found. But this argument is based on a misconception about the main source of damaging impacts: these will come not so much from the average change in surface temperature for a given latitude as from the changes in atmospheric circulation patterns (and, accordingly, patterns of precipitation and of temperature extremes) resulting from the impact of the greenhouse effect on the whole, global climate 'machine'.
 24. There is a certain irony, of course, in the circumstance that the world now seems in greater danger of depleting its 'renewable' resources than of depleting its 'non-renewable' ones; but that is what the evidence suggests.
 25. Ruth Leger Sivard (*World Military and Social Expenditures 1987–88* (Washington, DC: World Priorities, Inc., 1987)) lists 119 conflicts involving 1000 deaths or more between 1946 and 1987, of which all but three took place in the South. This tally includes civil wars and insurrections. The number of wars involving two or more states (including civil wars in which another state intervened) was 60, of which 57 were in the South.
 26. Afghanistan and Vietnam are only two examples of this loss of ability to manage conflict in the Third World. The recent US invasion of Panama cannot be considered an exception, in that its objectives (primarily the overthrow of Manuel Noriega) were so limited.
 27. These data come from a variety of sources, including the World Resources Institute, the Worldwatch Institute, the United Nations, the Society for International Development, the *San Francisco Chronicle*, and the *New York Times*.
 28. Lester R. Brown & Edward C. Wolf, 'Reclaiming the Future', in Lester R. Brown et al., *State of the World – 1988* (New York: Norton, 1988), pp. 183.